[O16.04]

Optimizing laboratory and industrial micro-CT for food applications

J. Dhaene*[1], T. De Schryver[1], M. Dierick[1], S. De Man[2], J. Claes[3], L. Van Hoorebeke[1]

[1]UGCT - Ghent University, Belgium, [2]ILVO, Belgium, [3]Lab4Food - KU Leuven, Belgium

Introduction:

X-ray Computed Tomography (CT) is a non-destructive technique that can be used to investigate the inner structure of an object. Here, a method to achieve optimal scanning conditions and a method to correct for phase artefacts applied on food applications will be shown.

Methods:

Optimal scanning conditions are determined by the source and detector of the CT-scanner and the composition, size and density of the sample. All these components have an X-ray energy-dependent behaviour and as such it is not straightforward to find these optimal scanning conditions. At the 'Ghent University Centre for X-ray Tomography' (UGCT), a simulation tool, Arion, was developed to cope with this problem. This tool is able to take into account all energy-dependent aspects and the geometry of the CT-scan to simulate realistic radiographic projections and complete CT-scans.

On the other hand, just as visible light, X-rays will refract as they travel through a medium. This refraction will give rise to phase artefacts in the reconstructed 3D volume. These artefacts can be coped with by using a pre-processing phase correcting Paganin filter.

Results and Conclusion:

The optimal scanning conditions were determined to discriminate between the water and fat phases in butter. The simulations proved that a tube voltage of 30kV provides a better contrast-to-noise ratio than a scan at 120kV as was confirmed by the real scans (figure 1).

Figure 2 shows a reconstructed image of a cake sample without (a) and with (b) a phase correcting filtering applied. In the reconstruction without phase correction, the brighter spots and borders can be misinterpreted as denser regions in the cake. The phase correction is necessary to avoid misinterpretation of the CT data and to obtain a correct analysis of the air and fat structures inside the cake.

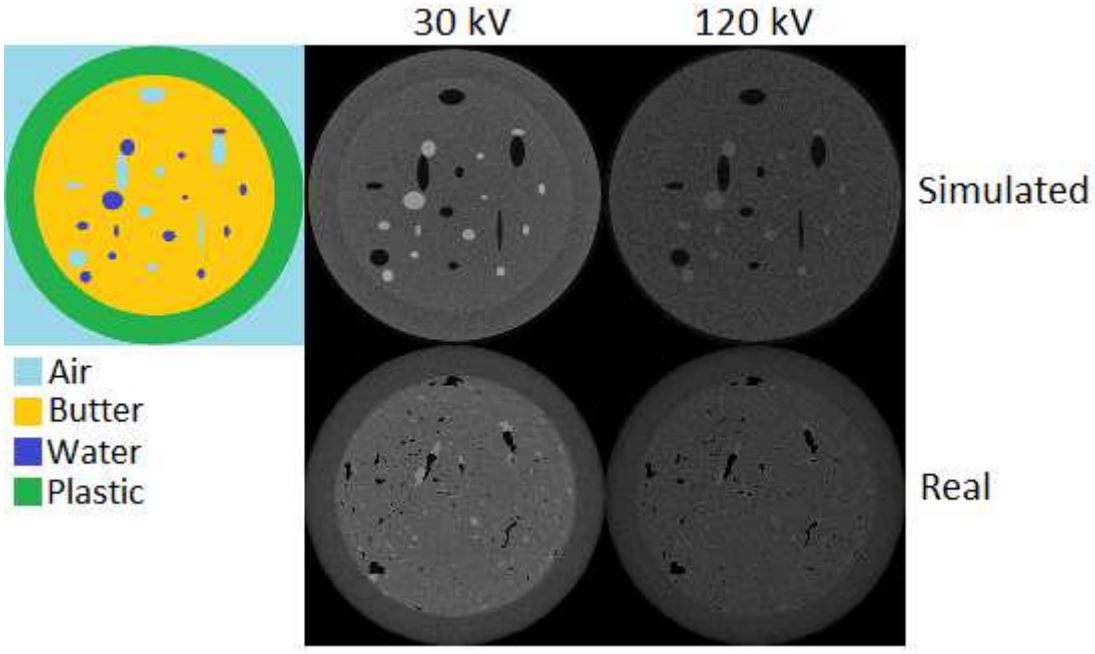

Figure 1

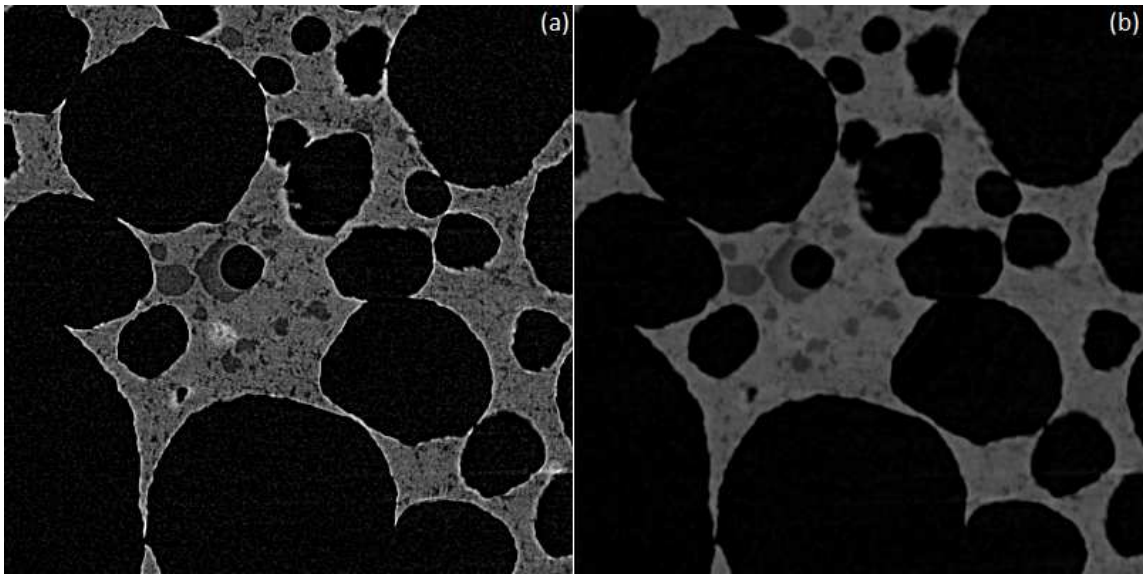

Figure 2

Keywords: micro-CT, Simulations, X-ray